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10/687,232	10/16/2003	Shung-Huci Chang	890-007.003	8049

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EXAMINER
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CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1795

MAIL DATE	DELIVERY MODE
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12/26/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/687,232

Applicant(s)

CHANG ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. In response to the amendment received June 5, 2007:
  - a. Claims 1-21 are pending;
  - b. The prior art rejections are withdrawn in light of Applicants arguments.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 5-10 and 12-20 are rejected under 35 U.S.C. 102(b) as being anticipated WO 02/080299 A1 (WO '299) as evidenced by U.S. Patent No. 7,081,317 (Fujii).

Fujii is the English equivalent to WO '299 and is relied upon as an evidentiary reference for a further understanding of WO '299.

WO '299 discloses of an apparatus and method of fabricating a fuel activation assembly for use in a fuel cell, the fuel cell comprising a first cell compartment for containing a first fuel component and a second cell compartment for containing a second fuel component, wherein the fuel activation assembly is disposed between the first cell compartment and the second cell compartment so as to activate the first fuel component for producing protons in the first cell compartment and for channeling the protons to the second cell compartment, said method comprising the steps of: providing

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a substantially planar substrate 11 in the fuel cell, the substrate having a first surface facing the first cell compartment and an opposing second surface facing the second cell compartment, the substrate having a plurality of apertures 16 made through the first surface and the second surface; and securely attaching a plurality of membrane electrode assembly segments 12/13/14 to the substrate over the apertures 16, each membrane electrode assembly segment 12/13/14 comprising a proton-exchange membrane sandwiched between two activation layers, wherein each membrane electrode assembly segment 12/13/14 has a first side and an opposing second side, the second side adjacent to the second cell compartment, the first side adjacent to the first cell compartment for activating the first fuel component in order to produce the protons and for channeling at least part of the protons from the first cell compartment to the second cell compartment via the apertures through the membrane electrode assembly segments (Figs. 1, 2 and 5 as applied to claims 1, 5, 12 and 17). The fuel cell array is used to power various electronic devices including computers (see col. 1, ll. 5-11 as further directed to claim 17).

The fuel cell further comprising a first electrically conducting terminal operatively connected to the first cell compartment; and a second electrically conducting terminal operatively connected to the second cell compartment, so as to allow a current load to connect to the first and second electrically conducting terminals to use the electrical current (as applied to claim 6).

The substrate is composed of a material selected from the group consisting of silicon, glass, ceramic, and plastic which is inherently resistant to diluted methanol mixtures (prior art claim 5 as applied to instant claim 7).

In Embodiment 7, the fuel is an aqueous methanol solution and the oxidant is air (see col. 8, ll. 50 through col. 9, line 16 of Fujii as applied to claims 7-9). The silicon substrate has an inherent level of water and alcohol resistance.

Each MEA 12/13/14 includes a proton exchange membrane 13 disposed between two electrode layers 12 and 14 (see col. 5, ll. 10-22 of Fujii and Figs. 1-2 as applied to claims 10 and 13).

Each MEA of adjacent cells are connected in series or parallel via connectors 15 and the appropriate switching means (See Figs. 2, 5 and 9-10 as well as col. 6, ll. 12-22 and embodiment 9 of Fujii as applied to claim 14) and at least some of the fuel cells are electrically connected in series such that the electrode layers of each of said at least some of the fuel cells are operatively connected to different ones of first and second electrode layers of different fuel cells (See Fig. 10 and Embodiment 10 of Fujii as applied to claim 15). The arrangement permits segments connected both in series and parallel (Fig. 10 and Embodiment 10 as applied to claim 16).

As discussed above, WO '299 is directed to portable electronic devices, including portable computers (see col. 1, ll. 5-11). Portable computers are held to reasonably encompass notebook, laptop and table computers with sufficient specificity and thus reasonably anticipates claims 18-20.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '299 as evidenced by Fujii, as applied to claim 1 above, in further view of JP 11-045729 (JP '729).

The teachings of WO '299 as evidenced by Fujii have been discussed above with respect to the fuel cell arrangement.

WO' 299 does not teach of the fuel cells having a heat bonding process for sealing the fuel cell.

JP '792 discloses using hot-melt seals in PEM fuel cells to seal the reactants from one another and from external contaminants.

The motivation for using sealing the fuel cell substrate is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of WO '299 by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

4. Claim 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO '299 as evidenced by Fujii, as applied to claim 1 above, in further view of either U.S. Patent No. 6,960,403 (Morse) or U.S. Patent Application Publication No. 2005/0019635 (Arroyo).

The teachings of WO '299 as evidenced by Fujii have been discussed above with respect to the fuel cell arrangement.

In Embodiment 7, the fuel is an aqueous methanol solution and the oxidant is air (see col. 8, ll. 50 through col. 9, line 16 of Fujii as applied to claim 4). The silicon substrate has an inherent level of water and alcohol resistance.

The difference between claim 3 and WO '299 is that WO '299 does not teach of using an adhesive to create a barrier (claim 3).

As to claim 3:

Morse discloses sealing a microscale planar fuel cell between adjacent substrates (Fig. 2) wherein the sealing is provided to prevent reactant crossover between the anode and cathode. The bonding material is provided with an adhesive (col. 3, ll. 30-32). Arroyo discloses using an adhesive bonding to seal opposing base plates in a direct methanol fuel cell (para. [0068], [0097], [0100] and [0101]). The motivation for using an adhesive is that it improves the integrity of the seal in the microfuel cell and provides an improved seal barrier between the anode and cathode of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of WO '299 by providing an adhesive to the sealing of the fuel cell since it would have improved the integrity of the fuel cell seal and provided an improved seal barrier between the anode and cathode of the fuel cell.

5. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '299 as evidenced by Fujii as applied to claims 5 and 10 above and in further view of U.S. Patent No. 6,127,058 (Pratt).



The teachings of WO '299 have been discussed above with respect to the fuel cell arrangement.

The difference between claim 11 and WO '299 is that WO '299 does not teach of using diffusion layers over the electrodes.

According to Pratt: Electrodes of the MEA have several functions. They must: 1) diffuse oxygen and hydrogen evenly across the surface, 2) allow water molecules to escape (principally a cathode-side issue), 3) hold back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyze the reactions, 5) conduct electrons so they can be collected and routed through an electrical circuit, and 6) conduct protons a very short distance to the proton exchange membrane. To accomplish these disparate needs, MEAs typically consist of several layers of various forms of carbon and polymers in addition to the catalyst. Both the water management and the electron conduction functions are satisfied with dual role diffusion layers which are sandwiched over the catalyst layers. These diffusion layers are usually comprised of woven carbon fiber cloth or porous carbon paper. In practice, the diffusion layer can be integral to the electrodes, integral to the current collectors, or a separate piece sandwiched between the current collector and the electrode. In our preferred embodiment, the diffusion layer is incorporated in the electrodes, but it can also be part of the current collector or a separate piece. For simplicity, we assume that the diffusion layer does not restrict the relative proximity of the current collector and the electrode.

The motivation for using diffusion layers in the electrodes or adjacent to the electrodes in an MEA is that it diffuses oxygen and hydrogen evenly across the surface,

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2) allows water molecules to escape (principally a cathode-side issue), 3) holds back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzes the reactions, 5) conducts electrons so they can be collected and routed through an electrical circuit, and 6) conducts protons a very short distance to the proton exchange membrane.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of WO '299 by employing diffusion layers in the electrodes or adjacent to the electrodes in an MEA since it would have diffused oxygen and hydrogen evenly across the surface, 2) allowed water molecules to escape (principally a cathode-side issue), 3) held back a small amount water to keep the membrane wet and efficient (cathode side issue only), 4) catalyzed the reactions, 5) conducted electrons so they can be collected and routed through an electrical circuit, and 6) conducted protons a very short distance to the proton exchange membrane.

6. Claims 18-20 are alternatively rejected under 35 U.S.C. 103(a) as being unpatentable over WO '299 as evidenced by Fujii and U.S. Patent No. 7,033,691 (Mardilovich).

As discussed above, WO '299 is directed to portable electronic devices, including portable computers (see col. 1, ll. 5-11). Portable computers are held to reasonably encompass notebook, laptop and table computers with sufficient specificity.

In the alternative, even if it is argued that WO '299 does not anticipate these electronic devices the concept of combining the fuel cell array of WO '299 with the

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specific portable electronic devices of claims 18-21 is not a novel contribution to the art and would have been readily apparent to one of ordinary skill in the art.

Regarding the claimed load:

The use of direct methanol fuel cells in various portable electronic devices, including portable computers and PDAs is a well-known power source for such devices as shown by Mardilovich (col. 1, ll. 20-40). The motivation for using fuel cells in portable computers or PDAs is that it provides the portable electronic device with a lightweight, reusable, efficient, and reliable power sources.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of WO '299 by selecting the load to be a portable electronic device since it would have provides a portable electronic device having an alternative power source which is light-weight, reusable and more efficient than conventional batteries.

7. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO '299 as evidenced by Fujii and U.S. Patent No. 7,033,691 (Mardilovich).

As discussed above, WO '299 is directed to portable electronic devices, including portable computers (see col. 1, ll. 5-11). Portable computers are held to reasonably encompass notebook, laptop and table computers with sufficient specificity.

WO '299 does not teach that the portable electronic device is a PDA.

Regarding the claimed load:

The use of direct methanol fuel cells in various portable electronic devices, including portable computers and PDAs is a well-known power source for such devices

as shown by Mardilovich (col. 1, ll. 20-40). The motivation for using fuel cells in portable computers or PDAs is that it provides the portable electronic device with a light-weight, reusable, efficient, and reliable power sources.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of WO '299 by selecting the load to be a portable electronic device since it would have provides a portable electronic device having an alternative power source which is light-weight, reusable and more efficient than conventional batteries.'

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:30-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
gc  
December 20, 2007

Gregg Cantelmo  
Primary Examiner  
Art Unit 1795